TROPICAL RAINFALL MEASURING MISSION

December 22, - December 28, 1997
DOY 356 - 362

TRMM MISSION OPERATIONS

- The next Delta-V maneuvers are scheduled for January 1 and January 17, 1998
- New configuration codes with updated frequencies specified will become active with NCC on January 12th (not the 5th as originally scheduled).
- CERES Deep Space Calibration maneuvers are scheduled for January 7 and 8, 1998.
- ACS Contingency mode test is scheduled for January 13, 1998, beginning at 1215z.
- The next 180° yaw maneuver is scheduled for January 14, 1998 at 2048z.
- The post-launch Database generation is scheduled for January 15, 1998.
- The Beta angle range for the week of December 22 - December 28 was -32.6° to -57.2°, and -57° to -44° for the week of December 29 - January 4.

TRMM SUBSYSTEM OPERATIONS

Attitude Control System

ESA quadrants 1 and 3 periodically showed ADC status: BAD. This was due to Sun interference during those time periods as shown in the GSOC created Earth Sensor Interference planning aids.

Quadrant 1 also showed an OVER_RANGE state for the first time during Sun Interference periods on Day 357. The over-range state is an actual bit in ESA telemetry to the ACEs, and seems to occur when sun interference is sufficient to significantly increase ORS voltage levels (which reached its Yellow High limit during this period). During the time of the interference, ACS performed nominally.

On Day 362 at 18:45:12, FDC test 0 failed the first limit and switched to the redundant X-axis gyro (action 16). This FDC action resulted because the failure criteria was met for 5 consecutive 500 ms samples. The decision was made to widen the 5 sample smoothing limit to 10, to avoid tripping the second action, which would result in a switch to ACE B telemetry and control. A real-time command request was written to modify this value (in table 53), and then to return to the nominal primary gyro x axis condition, and will be implemented on Day 364. The steps involve running the airu_config procedure and then re-enabling FDC actions 20 and 21 which were disabled by action 16. The last step will reset FDC test 0 again.

The root cause of the FDC action is still under investigation. However, the reason the FDC criteria was exceeded was due to a sudden command to gimbal both the plus and minus solar arrays while still in tracking mode (plots showed the commanded velocity spiked to 30.048 pps). This in turn introduced a spacecraft rate which exceeded the gyro x axis analog telemetry

threshold. Further trending showed that the commanded and sensed solar array gimbal positions coincided, discounting any GSACE-related cause to the anomaly, although the commanded gimbal positions did oscillate rapidly during the 5 second period in question. More long term trending is being looked at to see if this problem has been occurring more frequently, especially at higher beta angles.

Flight Data System (FDS)/Command & Data Handling (C&DH)

FS/Clock

The UTCF is being tracked during each event, with the drift at approximately 0.31 µsec/hr. The FS will not be adjusted until the clock drift rate exceeds 0.5 µsec/hr. The Spacecraft clock is actually about 145 µsec behind GMT. The UTCF will be adjusted when the error reaches 500 µsec, or at the time the FS Offset is adjusted (whichever occurs first).

Stored Command Processor

Stored command processors buffers are being switched daily between A and B with no anomalies.

Solid State Recorders

Data Storage operations were nominal. All data was successfully recovered.

Although we continue to experience Q-channel Restarts when playing back and retransmitting data, they have not interfered with operations.

The FOT will continue to track Bus retries. Retries are occurring on all 3 buses, spacecraft, ACS, and Instrument (see attachments).

Received 3 Instrument Bus Invalid Stream ID error messages on Day 356 at 08:03:14. Error messages coincided with flying through the SAA. Error also coincided with missing TMI packet segments according to the Payload Manager.

Received another EDAC Multi bit Error on day 357. Total count is now 3.

Reaction Control Subsystem (RCS)

The RCS performed nominally during this time period. The next Delta-V maneuver is scheduled for January 2, at 18:40z.

The Pressurant tank temperature reached a peak temperature of 27° and the Catbed Heater Temperature for Thruster 1 reached a low of -21° (both due to the high negative beta angle).

Power Subsystem

The Power Subsystem performed nominally during this period.

The glitch that occurs during day/night boundary occurred twice during this week. At the end of eclipse, the time in night flag went to a value of 1, and remained there until the next eclipse entrance. This set off the TSM #29 (VIRS Day/night transition) each time the TSM was reset.

Electrical Subsystem

The Electrical Subsystem performed nominally during this period.

Thermal Subsystem

The Thermal Subsystem operated nominally during this period.

Deployables Subsystem

The Deployables Subsystem operated nominally during this period.

RF/Communications Subsystem

The RF/Comm Subsystem operated nominally during this period.

A change to the NCC DB is scheduled to occur on January 12, 1998, to change the uplink frequency (to compensate for the drift in the Transponder center frequency). In addition, a CFO Adjustment (-1300 Hz) will also be uplinked to Transponder 2 at that time.

Note: During the past week, several events were scheduled with the new uplinked frequency. During those events the SPE was drastically reduced (0 for most events) for Transponder 1. Once the CFO adjustment is performed, the SPE for Transponder 2 will also be reduced.

SPACECRAFT INSTRUMENTS

CERES

The CERES Instrument performed nominally while performing its normal sequence of Crosstrack/Biaxial commanding. Checkout activities continued during this period.

Internal calibrations		**Solar Calibrations**	
Date	Time	Date	Time
day 357, Dec. 23	14:28z	N/A	N/A
day 359, Dec. 25	15:1 0z	N/A	N/A

CERES Main and MAM covers were successfully opened on day 361. CERES was commanded to Crosstrack immediately following cover opening.

On DOY 360, the CERES SPS1 sensed the Sun. Within the same scan, CERES was commanded to the Normal Scan profile via the stored command processor. Once the SPS1 sensed Sun and the scan type was Normal, the criteria for CERES to be autonomously put into the Safe mode was met. Upon investigation, it became evident that CERES was being put into Normal mode before completing the eclipse entrance/exit criteria, by about 20 seconds. This allowed enough time for CERES to be put into the Normal Scan and the SPS to see the Sun at the same time. CERES parameters in the Mission Planning system were changed to correct the problem. The new parameters will be used in the daily stored command load on day 364.

LIS

Instrument performed nominally.

PR

Instrument performed nominally while still operating in the checkout mode.

- RX gain value checkout activity was performed on day 356.
- PR external calibration was performed on day 359.
- PR internal calibration was performed on day 360.
- PR along track was performed on day 361.
- PR Analysis mode was performed on day 362.

PR continues to be commanded to Standby mode over the defined WSC and Australia regions.

TMI

Instrument performed nominally.

VIRS

During 2 occurrences, one on Day 357 and the other on Day 359, VIRS telemetry seemed to be bad for one packet. Telemetry showed accurate values on the next telemetry update. This was due to a known problem with VIRS housekeeping telemetry becoming invalid once in a while.

VIRS warning messages continue to occur. Messages x'2F' and x'78', which are listed as known problems, occur almost daily. Warning message x'30' occurred, which is expected when messages x'2F' and x'78' occur simultaneously.

VIRS FPA Heater power went to red high, then back within limits. It had been previously documented (see anomaly report #37) that this telemetry point has no meaning when the cold stage heater is OFF. Therefore, no action was taken.

VIRS was put into Night mode 3 extra times on Day 359 and 3 more times on Day 362, due to a glitch in the PSIB during eclipse/Sun transition periods (See Power Subsystem section above). As a result, approximately 108 minutes of Visible data (VIRS Channels 1 and 2) were lost.

GROUND SYSTEM

NCC port was switched back to Port 3. However, unsuccessful receipt of UPDs made us change back to Port 14 until after the holidays when full hardware support could be provided.

Raid platter 2A failed. Reconstruction was unsuccessful.

The FOT was unable to generate a SC ATS Load on Day 357 and 358 (load for Day 361). The problem was eventually resolved, once a catalog file was manually removed from the MOC Planning System. The Catalog file was apparently too large.

ANOMALIES

The following discrepancy reports were written during this time:
#40: S/C Software Bus Error - See FDS section above
#41: Invalid VIRS telemetry - See VIRS section above
#42: ESA ORS high voltage - See ACS section above
#43: TSM#29 execution - See Power subsystem and VIRS instrument sections above
#44: CERES-Stored command processor interaction - See CERES section above
#45: Failover to Redundant IRU - See ACS section above

ATTACHMENTS

Two attachments (Excel Spreadsheets):

Bus Retries - Documents occurrences of Bus Retries

Q Chnl Restarts - Documents occurrences of Q-Channel Restarts

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